

# Long-run Performance Following U.S. Bank Mergers & Acquisitions

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This paper examines the long-run stock and operating performance of bank mergers during period (1985-1999). To this end, the paper compares the post-merger performance with the pre-merger performance of the merging banks utilizing pre-and post-merger accounting data. The performance effects measured by profitability ratios are mixed. Merged banks show no significant improvement in return on assets relative to their peer group, while they have significant improvements in return on equity. The sub-period analysis suggests that more recent bank mergers have more positive effects than earlier mergers, and that large targets are associated with more successful mergers.

A buy-and-hold abnormal return technique and the Fama and French (1993) three-factor model are used to evaluate the long-run returns following bank mergers. The empirical evidence indicates that merged banks have significantly under-performed their peer group of non-merged banks. Such poor performance can be attributed to the larger banks in the sample, suggesting that size is an important explanatory variable of long-run post-merger performance.

*JEL classification:* G0

*Keywords:* Banks, Mergers, Acquisitions, Fama and French three-factor model

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## 1. Introduction

The last decade has witnessed an unprecedented pace of bank merger and acquisitions. In particular, between 1990 and 2002, the number of mergers and acquisitions activities surged by about 520 per year compared with 345 per year over the (1980-89) period. Consequently, the number of banks operating in the U.S. has declined by about 33 as compared to 1990. Such a rapid pace of bank mergers and acquisitions is likely to continue into the future. Moreover, the pace of bank acquisitions of securities firms and insurance companies is also likely to rise in the future as a result of the recent enactment of the Gramm-Leach-Bliley (GLB) Act of 1999.<sup>1</sup> The said trend in bank mergers represents one of the most discussed issues in the current banking literature.

In spite of abundance of literature, a number of issues still remain unresolved. One such issue is performance of merged banks in the long-run, which is investigated in this essay. This issue takes on a special significant in light of findings of previous studies which conclude that abnormal returns to bidders are small or at least insignificantly different from zero in the short-run.

A considerable amount of research has been conducted on bank mergers with a focus on merger motives, and the immediate market reaction to their public

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<sup>1</sup> GLB allows banks, brokerage firms and insurance companies to merge.

announcement. However, much less attention has been devoted to determining whether mergers enhance combined firm value over the long run. Our objective is to evaluate the long-term effect of merger on the combined firm

Several reasons make the study of long-run performance relevant. First, from an investor's viewpoint, an existence of price patterns may present opportunities for active trading strategies to produce superior returns. Second, the premium paid to merger targets can be justified only if there is a long-term improvement in both operating and market performance of the combined firms. Third, despite continuously ongoing research on bank mergers, we still know surprisingly little about the long-run performance following bank mergers. While the immediate market reaction to bank mergers has been studied extensively, the long-run performance resulting from mergers has been largely ignored. The contribution of this paper to the bank mergers literature is to help bridge this significant gap.

Early studies of long-run performance simply extended event study techniques to a longer horizon. Such analysis compares the subsequent equity performance of each individual firm associated with the event study to that of a reference portfolio. Some researchers make specific adjustments for the security's beta or other factor loading. However, Kothari and Warner's (1997) simulation evidence suggests that the size and power of these parametric tests are both overstated. In particular, the abnormal returns computed by subtracting benchmark portfolio returns from an individual security's returns tend to be substantially skewed. Barber and Lyon (1997) reiterate the importance of simple abnormal returns' skewness, and describe additional potential biases that may arise from new listings and market portfolio rebalancing. All of these problems can be alleviated by using peer-adjusted, buy-and-hold abnormal returns (BHARs) to measure long-run performance effects, as in Ritter (1991). For each sample firm, Barber and Lyon (1997) suggest choosing a peer firm based on market capitalization and their equity's book-to-market ratio. The difference between the sample firm's and its peer firm's holding period returns then indicates the impact of the studied event on subsequent performance. Barber and Lyon conclude that this BHAR technique produces well-randomized samples when appropriate peer firms are chosen.

Since there is still no consensus in the literature regarding the valuation consequences of bank merger, it is important to maintain the careful evaluation of the performance of banks engaged in mergers using a variety of samples and empirical methodologies. More importantly, the principle drawback of the extensive event study in bank mergers literature is its short-run focus. While *ex ante* expectation are important sources of information, the possibility exists that the market does not always accurately predict the future performance of bank mergers in the short time period surrounding announcement. Therefore, an evaluation of the long-run performance of bank mergers may be necessary. Accordingly, the paper makes a valuable contribution to existing literature by currently investigating the long-run post-merger operating as well as market performance of the bank merger

sample by examining the monthly returns from a sample of banks over thirty-six to sixty-month intervals following their announcements to merger. The paper uses buy-and-hold abnormal returns and the Fama and French (1993) three-factor model to measure long-run wealth effects of bank mergers. This is the first paper to examine the long-run performance following bank mergers using those two techniques.

As for operating performance, we utilize traditional ratios such as return on assets (ROA) and return on equity (ROE). ROA and ROE are the most commonly used measure of bank profitability. For the post-merger period, the analysis will focus on the combined firm relative to a control group. Post-merger data are compared with pre-merger data to determine the performance changes that took place upon the transition from pre-merger to post-merger. The control group is particularly valuable because it permits an assessment of whether any observed changes in the combined firm simply reflect changes in economic environment or, instead, are unique to the combined firm.

The results of long-run operating performance indicate that there are statistically significant improvements in profitability in terms of ROE following mergers. However, profitability in terms of ROA shows no virtual improvement (i.e. the improvement is not statistically significant).<sup>2</sup> We also find evidence that banks engaged in mergers, on average, under-perform the peer group before the merger and outperform it after the merger. This indicates that mergers are able to improve ROE, and it may imply that profitable motivations are driving bank mergers. Additionally, when we examine pre-merger and post-merger profitability in terms of ROA, we find that ROA is unrelated to merger activity. Upon further analysis, our findings also show that more recent bank mergers have more positive effects than earlier mergers. Notably, only more recent bank mergers were able to achieve significant cost cuts. Another interesting finding is that mergers in which small banks are involved show large cost savings compared with the large bank mergers. This sounds intuitively correct, as it is easier to implement cost savings when the overall size of the new banks remains manageable. Lastly, our empirical results suggest that large targets are associated with more successful mergers.

The results of long-run stock returns show that merged banks exhibit significant underperformance after a merger. Buy-and-hold abnormal return results indicate that merged banks underperforms a matched bank of similar size by almost 18.4% in five years following the merger. The Fama-French three-factor regression model yields underperformance of -10% over the five-year post-merger period. Notably, recent studies of bank mergers such as Becher (2000) and Houston et.al. (1994) find that bank mergers create statistically significant increase in value for the combined firms. In contrast, we find evidence of long-run underperformance following bank mergers that is statistically significant. This finding indicates that it may be difficult for investors to earn profits by trading on this underperformance. Further analysis shows that this poor performance can be attributed to the larger banks in the sample.

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<sup>2</sup> ROE is the product of ROA times equity multiplier.

This result confirms our earlier finding, suggesting that size is an important explanatory variable of long-run post-merger performance. Finally, the paper examines each calendar year to determine if the underperformance is concentrated in certain years of the study, and find evidence that more recent bank mergers are associated with better performance than earlier mergers. However, the average performance of recent mergers is still worse than that of comparably sized banks.

The remainder of the paper is designed as follows. Section 2 reviews related literature. Section 3 describes the data and methodology. Section 4 reports our empirical results and section 5 concludes.

## 2. Literature Review

The main reasons for mergers are to improve the financial situation of the company concerned and to gain a better position in the market. Banking is becoming an increasingly global industry, which knows no geographic and territorial boundaries. The trend towards mergers in banking is also affected by unprecedented growth in competition, the continued liberalization of capital flows, the integration of national and regional financial systems, and financial innovations. The goals of mergers and acquisitions can be divided into strategic goals, which cannot be quantified as a rule, and to quantifiable financial goals, primarily to economies on costs. Other reasons for bank mergers are to extend the range of products and services, increase the market share, diversification of risks and geographic diversification.

The bulk of the empirical studies of the impact of bank mergers on bank performance can broadly be classified into two broad categories. The first group can be found in the banking literature, and comprises what are called "event studies" or ex ante studies, which try to assess the bank merger performance indirectly by analyzing the reactions of the stock market to merger announcements. The second group consists of studies that pursue a direct assessment by analyzing the effects of bank mergers on real firm performance in as far as this can be gauged from internally generated accounting data, or so called ex post studies. Ex post studies measure bank performance mainly by comparing various financial ratios before and after mergers. Comparing the performance with a relevant control group of banks typically assesses the rates of success or failure.

The "event studies" generally assume that stock markets are efficient, meaning that changes in the share prices of the banks involved, after controlling for market movements in general and systematic risk, represent the value of the event. In this case, the market model is typically used to calculate the expected returns for the bank in question. Systematic changes on the residuals (abnormal returns) from the market model around the event will then show the effects of a merger. An alternative method of examining merger benefits is the use of operating performance measures. Operating performance is measured by comparing the performance banks, based on accounting data, before and after mergers relative to a relevant control group to determine whether mergers results in gains. Merger performance studies reflect the

interest in cost cutting and efficiency in the banking industry, particularly through merger.

Evidence from a large number of studies analyzing short-term stock reactions to bank merger announcements indicates that they do not create value for the combined firm and that a target bank's shareholders benefit, and a bidding bank's shareholders generally lose or break even. Houston, James, and Ryngaert (2001) and Becher (2000) report that target shareholders gain at the expense of bidder shareholders. However, these authors find that bank mergers in the 1990s create value for the combined firms. The studies of the short-term reactions to bank mergers in the 1980s show mixed results (James and Weir, 1987; Neely, 1987, and Cornet and De, 1991). In general, the only consensus result of this research is that targets gain around merger announcements. It is noteworthy that Madura and Wiant (1994) are the only researchers that study abnormal returns of acquirers over a lengthy period following the merger. They find that average cumulative abnormal returns of acquirers, in a sample of 152 acquisitions taking place between 1983 and 1987, were negative during the 36-month period following the merger announcement. Additionally, abnormal returns were negative in nearly every month. Acquirer losses around the time of the announcement may reflect a loss of wealth from an overly generous merger price. Negative abnormal returns in months after the announcement, however, are not likely to be due to the price. They seem more attributable to either the merger achieving fewer benefits than projected, or the market revising downward its expectations for the merger.

A common justification for bank mergers is that they reduce costs and improve operating efficiency, which in turn increases shareholder returns. However, the empirical studies in the existing research on bank mergers do not support this claim. Much of this work shows that bank mergers do not improve bank-operating performance. For example, Berger and Humphrey (1992) and Rhoades (1994) find that there is basically no cost efficiency improvements associated with banks mergers. Almost all of the studies that find no gain in efficiency also find no improvement in profitability, if they include both measures. In contrast, the studies that report at least some evidence of performance improvement do not obtain consistent efficiency and profitability results, or they are unique in some respect, or both. For Example, Frieder and Apilado (1993) analyze a profitability measure but not an efficiency measure, and the profitability measure is based on differences between actual and hypothetical net income. Spindt and Tarhan (1992) find some improvement in return on equity (ROE) from bank mergers but no significant improvement in return on assets (ROA) or cost efficiency (non-interest expenses divided by total assets). Corentt and Tehranian (1992) compare pre-merger and post-merger performance of thirty large bank holding companies occurring between 1982 and 1987. They find that cash flow returns, relative to a national group of publicly traded banks that did not engage in merger activity, improve following mergers. They also find that ROE improves, but not ROA. Spong and Shoenhair (1992) find evidence of an improvement in overhead

cost efficiency following bank mergers but generally no improvement in ROA or ROE. On the other hand, Peristiani (1993) finds some improvement in ROA following mergers but generally no improvement in cost ratios and efficiency measures. Spindt and Tarhan (1993) find that mergers do exhibit operating gains, but their results may be due to primarily economies of scale.<sup>3</sup>

Linder and Crane (1992) analyze the operating performance of 47 bank-level interstate mergers that took place in New England between 1982 and 1987. Of the 47 mergers in the sample, 25 were consolidations of subsidiaries owned by the same holding company. The authors aggregate bidder and target data one year before the merger and compare it to performance one and two years after the merger. The performance of merged banks is compared to the performance of all non-merging bank in the same state as the merging entities. Their results show that mergers do not result in improved operating income, as measured by net interest income plus net non-interest income to assets.

More recently, Rohades (1998) compares bank profitability ratios, such as ROA or ROE before and after mergers relative to peer groups of banks that did not engage in mergers. He finds improved profitability ratios associated with bank mergers. On the other hand, others find no improvements in these ratios ( Pilloff, 1996, Akhavein, Berger, and Humphrey,1997).

Another possible motivation behind bank mergers is diversification. Akhavien et al. (1997) report that during periods of industry consolidation, diversification is beneficial. Mergers may produce wealth gains even without increasing cost efficiency by diversification. Berger (1998) finds that bank mergers serve to diversify banks, thereby allowing them to take on more investment risk for a given level of firm risk. However, there is no evidence of a link between this incremental diversification and increased shareholder returns. Overall, the operating performance studies provide substantial evidence that bank mergers do not generally yield performance improvement, in terms of either profitability or cost efficiency.

### 3. Data and Methodology

This section describes the data and methodology used in this study. The merger data come from the M&A database of the Center for Research in Security Prices (CRSP) tapes. To create a sample of mergers during the 1985-1999 period, all firms from the Center for Research in Security Prices (CRSP) tapes that have a delist code in 200s (merger) or 300s (exchange) were selected. To focus on banks, all firms with three-digit SIC codes of 602 (banks) or 671 (holding companies) were chosen. The cut-off year of 1999 is necessary because at least three years of stock return and accounting data should be available for each merger. This resulted in preliminary sample of 1323 bank mergers.

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<sup>3</sup> It is unclear whether their results are applicable to large mergers which are most strongly transforming the banking industry.

A merger included in the final sample is required to meet the following criteria: (a) both of the merged banks must be traded on the New York Stock Exchange (NYSE), the American Stock Exchange (AMSE), and Nasdaq daily tapes, (b) data for all of the ratios are available, (c) a single target bank is acquired in the same merger application, (d) both of the merged banks did not engage in another merger three years before or after the merger date. (e) the merger is not assisted by a bank regulator, (f) the target does not involve a failed bank, and finally (g) the merger must occur before 1999. The first criterion eliminates all failed-bank mergers and government assisted bank mergers. The second and third filters allow us to compare the three-year pre- and post-merger performance without the contamination of another merger, also ensuring the availability of banking data for at least two years before the merger date. Finally, we exclude the most recent mergers that do not have at least three years of reported data after the merger date. This process results in a sample of 662 bank mergers. The financial data used to calculate the performance measures for both merged banks and the non-merged banks are collected from COMPUSTAT data tape and the report of the Reports of Condition and Income Report database (Call Report) on the Federal Reserve Bank of Chicago's web page.<sup>4</sup>

**Table 1**  
**Descriptive statistics for selected variables**

This table presents descriptive statistics for a sample of 662 bank mergers for the period (1985-1999). Both bidders and targets are listed on CRSP and have valid announcement period stock returns.

	<b>Acquirer Bank</b>			
Variable (millions of dollars)	Mean	Std Dev	Minimum	Maximum
Market value of equity	7,210	11,652	11	165,223
Assets	18,905	38,107	244	214,482
	<b>Target Bank</b>			
Market value of equity	2,734	4,523	5	38,629
Assets	3,286	7,448	85	67,095
Value of transaction	326	910	2	13

Table 1 provides descriptive statistics for selected variables to our bank mergers sample. As the table shows, the book value of total assets and the market value of equity are expressed in 1999 dollars using the consumer price index. The average value of bank mergers is \$326 million. The mean asset value of the acquiring banks is \$18,905 million and of the targets is \$3,286 million. The mean market value of equity of the acquiring banks is 7,210 and of the targets is 2,734

The first approach in this paper is the operating performance, which permits us to focus specifically on profit, costs, and efficiency. To this end, we analyze changes in accounting profits rates and cost ratios. The financial performances of bank

mergers are analyzed over 3-year period pre- and post the merger. The year of the merger is excluded from the analysis, because it is affected by one-time merger costs incurred during that year.<sup>5</sup> Financial performance is measured through the following three ratios; return on assets, return on equity, and cost efficiency ratio. We use the following definitions for this study:

Return on Assets (ROA): net income as percentage of total assets.

Return on Equity (ROE): net income as a percentage of common shareholder's equity.

Cost Efficiency Ratio (CER): non-interest expenses divided by total assets.

ROA is an indicator of profitability and a good overall indicator a banking organization's performance. This ratio shows the ability of a bank to generate profits from the assets at its disposal.<sup>6</sup> ROE is used as an alternative measure of profitability and reflects the return to owners' investment. CER is a measure of cost control and is perceived as important to find whether bank mergers result cost savings from the merger.

The second approach utilizes stock return data to measure the long-run performance bank mergers. To this end, two measures are used: (1) 5-year buy and hold returns for both the merged bank and a set of matching banks and (2) Fama and French three-factor model. Also, three benchmarks are used to calculate excess stock returns. The first benchmark is the CRSP value-weighted NYSE-Amex-Nasdaq index. The second benchmark is a non-merger bank index, created by equally weighting all NYSE, Amex, and Nasdaq firms that meet the following restrictions: a Standard Industrial Classification (SIC) code of 602 (banks) or 671 holding companies, listed on CRSP for at least three years before entering the universe. The third measure of excess return is the Fama and French (1993) three-factor time-series regression model.

Buy-and-hold returns calculations start on the second CRSP-listed day for the sample and end (at the lower limit) on the five-year anniversary date of the merger or else the firm's delisting date.

Researchers have employed two distinct methodologies when examining the long-run performance of firms (see Lyon, Barber and Tsai (1999)).<sup>7</sup> One method involves careful construction of a "peer" portfolio that is similar to sample firms in all-important respects, except for the fact that the peer portfolio did not experience the event under study. Then buy and hold returns for each firm's subsequent holding period are averaged (or equally-weighted in the portfolio).

As matter of fact, buy-and-hold abnormal returns (BHARs) have become the standard method of measuring long-run abnormal returns (see Barber and Lyon (1997)). BHARs measure the average multi-year return from a strategy of investing in all firms that complete an event and selling at the end of a pre-specified holding period versus a comparable strategy using otherwise non-event firms. Stated

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<sup>5</sup> Therefore, including the year of the merger makes it hard to compare with results for other years.

<sup>6</sup> ROA is biased upward for some banks due to profits generated from off-balance sheet operations (see Rhoades, 1998).

<sup>7</sup> Loughran and Vijh (1997) use this methodology to analyze the long-run performance of acquisitions.



differentially, BHARs permit easy comparisons with earlier analyses of the long-run wealth effects following other financing events. In addition, BHARs measure an investor's experience if s/he were to try to profit from expected performance (Barber and Lyon (1997)).

Following Ritter (1991) and others; five-year holding period returns is defined as follows:

$$HPR_i = \prod_{t=1}^{60} (1 + r_{it}) \quad (1)$$

where  $r_{it}$  is the raw return on firm  $i$  in event month  $t$ . This measures (HPR) the total returns from a buy-and-hold strategy where a stock is purchased at the first closing market price after engage the merger announcement and held until the earlier of (i) its 5-year anniversary, or (ii) its delisting. In order to evaluate the holding period returns of bank mergers, a comparison with the matched banks' return is made. More specifically, we compute holding-period returns for each bank engaged in a merger and each of its matched control banks over a three- and a five-year period following the announcement date. Finally, as in Ritter (1991), the wealth relative is computed as a performance measure, defined as

$$WR = \frac{1 + \text{average five - year total returns on merged banks}}{1 + \text{average five - year total returns on the matched banks}} \quad (2)$$

where the average five-year total return is given by

$$\frac{1}{n} \sum_{i=1}^n HPR_i \quad (3)$$

We measure buy-and-hold abnormal stock returns (BHAR) as

$$BHAR = HPR (\text{merged banks}) - HPR (\text{matched banks}) \quad (4)$$

Thus, a wealth relative less than one is evidence that the portfolio of banks conducting mergers has under-performed the portfolio of matched banks; a wealth relative of greater than one can be interpreted as the bank merger sample outperforming a portfolio of a matched banks. Wealth relatives based on three-year returns are also calculated.

An alternative to the control portfolio method inspired by Fama and French (1993) has been employed in several empirical studies.<sup>8</sup> Specifically, Fama and French (1993) find out that a three-factor model may explain the cross-section of stock returns better than other proposed models. The intercept term from estimated regression equations containing the three Fama-French risk factors should be statistically insignificant in the absence of any abnormal long-run performance.

The three-factor model offers the advantage that it does not require size or book-to-market data for sample firms. Removing this requirement has two implications. First, firms without available data on market value of equity or book-to-market ratio can be included on the analysis. Second, some large firms or firms with low book-to-

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<sup>8</sup> See Loughran and Ritter (1995), Brave and Compers (1997), and Buttimer et al (2001).

market ratios may in fact have common stock returns that more closely mimic those of small firms or firms with high book-to-market ratios. The three-factor model allows for this possibility since the patterns of returns, rather than the explicit measurement of size or book-to-market, determines whether the returns on a firm's common stock more closely mimic the returns of small firms and/or high book-to-market firms.

This paper follows Fama and French (1993) and adopt a three-factor model to examine the long-term performance following the bank's announcement of a merger. The model is specified as follows:

$$R_{pt} - R_{ft} = \alpha + \beta_1(R_{mt} - R_{ft}) + \beta_2SMB_t + \beta_3HML_t + \varepsilon_{pt} \quad (5)$$

where  $R_{pt}$  is the return of bank  $p$ 's stock on date  $t$ , assumed to be normally distributed;

$R_{ft}$  is the risk-free interest rate on date  $t$ , typically using the 3-month T-bill rate in month  $t$ ;

$R_{mt}$  is the market return on date  $t$ , using the return to the CRSP value-weighted composite market index.

$SMB_t$  is the monthly difference in returns between a group of small firms and a group of large ones;

$HML_t$  is the monthly difference in returns between firms with high book-to-market and low book-to-market firms;

$\varepsilon_{pt}$  is an error term.

$SMB_t$  is intended to capture a size effect, and  $HML_t$  is intended to capture a book-to-market effect.<sup>9</sup> Fama-French regression models are estimated for the full sample. This regression yields parameter estimates of  $\alpha, \beta_1, \beta_2$ , and  $\beta_3$ . The parameter of interest in this regression is the intercept  $\alpha$ . A significant intercept term in (5) implies that abnormal returns are associated with the event analyzed. Fama-French regression is estimated using two alternative portfolio-weighting schemes: value-weighting firms' returns and equally-weighting. Previous researchers have observed that variation in the number of firms included in a different month's portfolio may cause heteroskeastic residuals in (5). This concern is addressed by reporting OLS and weighted least squares (WLS) coefficient estimates, where the WLS weights equal the square root of the number of firms in the portfolio for that month.

## 4. Empirical findings

### 4.1 Long-run operating performance

The most frequently cited motivation for bank mergers is that they improve performance by cutting costs. In order to examine this issue, we collect accounting data for the mergers sample for a period three-years before and after the merger. To

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<sup>9</sup> For a more detailed discussion of HML and MB see Fama and French (1993).

measure pre-merger performance, accounting data for the acquiring and acquired banks is combined to find pro forma performance for the merged firms. More specifically, for the year before merger, we find the weighted-sum of the ex ante accounting data of the acquiring and the acquired bank. The weights used are based on total assets for the acquiring and acquired banks before the mergers<sup>10</sup>. Our main objective is to measure the impact of bank mergers on the performance of the combined firms. To this end, we compare the ROA, ROE, and CER ratios in the year preceding the merger with each of the three years following the merger, excluding the merger year itself, between merged banks and the control group. Because some of the difference between pre- and post-merger performance may be due to economy-wide or industry factors, we use a control group of non-merged banks (matched bank). The non-merged banks are defined as banks comparable in terms of size, which is measured by total assets. This accounts for different market circumstance (or industry trends).

To measure the post-merger changes in bank operating performance, we compare the post-merger performance of the merged bank relative to its control group of similar sized banks with pre-merger performance of the merged banks to the peer group. Thus, we define change in relative operating performance for the *ith* bank merger as:

$$\Delta R = [R_{Ai} - R_A^{Peer}] - [R_{Bi} - R_B^{Peer}] \quad (6)$$

where  $\Delta R$  is the difference between pre-merger and post-merger, subscript A stands for after-merger and subscript B stands for before-merger. The absolute performances of each peer group ( $R^{Peer}$ ) are the average across all banks in the group of the three-year mean of the performance measure before and after the merger. For the merged banks, the absolute performance measures ( $R_i$ ) are the three-year mean of the performance variable before and after the merger year. Subtracting the relative performance of the merged banks before the merger from its relative performance after the merger yields the changes in relative operating performances. A positive  $\Delta ROA$  and  $\Delta ROE$  indicate better post-merger performance, while negative  $\Delta CER$  indicates better post-merger cost efficiency of the merged bank relative to the control group.

#### 4.1.1 Return on assets (ROA)

Panel A of Table 2 shows that although post-merger ROA of the merged banks improved by 0.076%, this improvement is not statistically different from zero. This finding suggests that mergers are not associated with significant change in return on assets (ROA), implying that managers are unable to generate benefits from bank mergers. To measure the effects of bank mergers over time and to examine the more recent mergers in particular, changes are calculated for three time periods: 1985-1989, 1990-1994, and 1995-1999. For the three periods, there are 119, 198, and 345 banks, respectively. In the 1985-1989 period, the difference between the pre-merger and

<sup>10</sup> The weights are the relative sizes (measured by total assets) of the two banks at the beginning of each year.

**Table 2**  
**Pre-merger, post-merger, and changes in performance for merging banks (1985-1999)**

	1985-1989	1990-1994	1995-1999	Full Sample
<b>Panel A: ROA(%)</b>				
<b>All mergers</b>				
Pre-merger	0.06	0.11***	0.17*	0.083
Post-merger	0.08	0.15	0.23**	0.159**
Difference	0.02	0.40	0.06*	0.076
<b>Large mergers</b>				
Pre-merger	0.11	0.04	0.10	0.072*
Post-merger	0.07*	0.05	0.12	0.66
Difference	-0.04	0.01***	0.01	0.584
<b>Small mergers</b>				
Pre-merger	0.14	0.17*	0.19	0.171
Post-merger	0.22	0.42	0.28**	0.193
Difference	0.08	0.25	0.09	0.022
<b>Panel B: ROE (%)</b>				
<b>All mergers</b>				
Pre-merger	-1.09	-0.80	-1.40	-1.86*
Post-merger	1.24	1.85	2.3	1.75
Difference	2.33***	2.65*	3.70**	3.61***
<b>Large mergers</b>				
Pre-merger	-0.06	-0.44*	-2.30	-0.95
Post-merger	1.93**	1.58	0.16	1.34*
Difference	1.99	2.02**	2.46**	2.25***
<b>Small mergers</b>				
Pre-merger	-0.02	0.01	-0.033	-0.021
Post-merger	0.51	0.85	1.407	0.938
Difference	0.53	0.84***	1.44*	0.959**
<b>Panel C: CER (%)</b>				
<b>All mergers</b>				
Pre-merger	-0.05**	-0.07**	-0.28*	-0.123
Post-merger	-0.14*	-1.17**	-1.62*	-0.984**
Difference	-0.09	-1.10	-1.34**	-0.861
<b>Large mergers</b>				
Pre-merger	-0.03*	-0.01**	-0.33**	-0.145
Post-merger	-0.27	-0.19	-1.07	-0.570
Difference	-0.24	-0.18	-0.74***	-0.425
<b>Small merger</b>				
Pre-merger	-0.12*	-0.38**	-0.18*	-0.233***
Post-merger	-1.78*	-2.22*	-1.24**	-1.759
Difference	-1.66	-1.84**	-1.06*	-1.526

(\* , \*\* , \*\*\*) Differences are significantly different from zero at the 10%, 5%, and 1% level, respectively.

Notes: Before the merger, performance measures for the merged bank are weighted averages of target and acquirer values, with the weights being the relative size of the two banks. All performance measures control for size (see eq.6 in page 15). Mean differences are the mean values of pair-wise differences in the pre- and post-merger period means.

post-merger ROA (0.02%) is not statistically significant. A similar result is found when examining pre- and post-ROA merger for the period 1990-1994, indicating ROA is unaffected by merger activity, as ROA shows no significant improvement. Our findings are consistent with those reported by Cornett and Tehranian (1992) and Pilloff (1996). On the other hand, we notice that there is significant improvement in ROA in the 1995-1999 period. The pre-ROA was 0.17% and rose to 0.23% after the mergers. The difference (0.06%) is significantly different from zero. The results for the 1995-1999 mergers suggest that recent banks mergers are more profitable than earlier bank mergers.

#### **4.1.2 Return on equity (ROE)**

Our second measure of profitability is return on equity (ROE). Panel B of Table 2 shows that, following bank merger, there is statistically significant improvement in ROE. All of the entries in Panel B are positive, reflecting strong post-merger performance of the merged bank relative to the peer group. This result is consistent with those of Cornett and Tehranian (1992). However, it contrasts with those reported by Pilloff (1996). Table B also details our results over the same three time periods used for ROA. For the 1985-1989 period, the pre-ROE was -1.09% and rose to 1.24% after the merger. For the 1990-1994 period, the pre-ROE was -0.80% and rose to 1.85% after the merger. As for the 1995-1999 period, the pre-ROE was -1.40% and rose to 2.3% after the merger. Clearly, ROE tends to increase significantly following mergers. Another interesting finding in this table is that banks engaged in mergers are, on average, under-performing the peer group before the merger and outperforming it after the merger. This indicates that mergers are able to improve ROE, and it may imply that profitable motivations are driving bank mergers.

#### **4.1.3 Efficiency ratio (CER)**

Following Cornett and Tehranian (1992) and Rhoades (1998), we examine an operating cost ratio that excludes interest expenses. Berger, Demsetz, and Strahan (1999) argue that cost ratios do not control for input prices, and so a reduction in costs per unit of output or assets can reflect either lower interest expenses due to increased market power in setting deposit interest rates or greater efficiency in input usage. They suggest that cost ratios that exclude interest expenses are not subject to this problem.<sup>11</sup> Therefore, we use cost efficiency in terms of non-interest expenses divided by total assets.

Panel C of Table 2 shows pre-merger and post-merger cost ratios as well as changes in cost ratio for the overall period and the three time periods. As we can see from this table, there is no significant improvement in this ratio for the entire sample. Also, there are decreases of 0.09%, 1.1%, and 1.3% in the ratio of non-interest expenses to total assets for the 1985-1989, 1990-1994, and 1995-1999-time period, respectively. However, only the decrease of 1.3% is significantly different from zero, suggesting improved efficiency in the 1995-1999 period. This finding is comparable to the results obtained by Cornett and Tehranian (1992). The results presented in this table also

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<sup>11</sup> For more details about the drawback of other ratios see Berger, Demsetz, and Strahan (1999).

confirm our earlier findings reported in Panel A using ROA, suggesting that recent banks mergers seem to be more efficient than earlier bank mergers.

#### 4.1.4 Small mergers versus large mergers

In sections 3.1, we examined pre-merger and post-merger performance, as well as changes in operating performance for the 1985-1989, 1990-1994, and 1995-1999 periods and for the full sample. In order to find whether the size of the mergers affects our results, we analyze our results separately for large mergers and small mergers.

Panel A of Table 2 shows that profitability in terms of ROA is largely unrelated to size. There is no systematic pattern in the size distribution of the average ROA ratios. Surprisingly, this is not the case for ROE. There is some evidence that size may matter as we see the distribution of the ROE ratios in Panel B of Table 2. Small bank mergers appear to be less profitable, especially relative to group of largest banks in the respective subsamples. Mergers of large banks achieved higher improvements in ROE compared to small bank mergers. There is significant increase in ROE of 2.25% following large mergers. When we examine large merger across three time periods, we find that they achieved 1.93%, 2.02%, and 2.46% improvement for the 1985-1989, 1990-1994, and 1995-1999 periods, respectively. In the case of small bank mergers, improvements were much smaller, averaging around 0.94% for the 1985-1989, 1990-1994, and 1995-1999 periods. Possible explanations are that very small banks rely on a limited range of products to generate revenues and/or have less market power than their larger competitors.

In the case of cost efficiency ratio (CER, Panel C), merged banks seem to have increased their cost efficiency in the years after the mergers (only for 1995-1999 period). This is especially true when the deal occurred between two small banks. Mergers in which small banks are involved show large cost savings compared with the large bank mergers. This sounds intuitively correct, as it is easier to implement cost savings when the overall size of the new banks remains manageable.

#### 4.1.5 Cross-sectional analysis of ratio changes

Post-merger performance may be influenced by the pre-merger performance of either the acquirer or target or the relative difference in acquirer and target bank performance. For example, an efficient acquirer may think that it has superior managerial capabilities and thus look for poor performing targets to which its superior management skills may be applied. On the other hand, a weakly performing acquirer may try to find a merger partner (target) and use the merger as the channel to overcome managerial ineffectiveness and improve its functions. In other words, mergers may be used to discipline inefficient managers. According to Berger (1998) the merger enables banks to wake-up management or the merger may be an excuse to restructure both partners (acquirer and target).

To examine whether merger-related improvements are influenced by a merger partner's characteristics, correlations between pre-merger characteristics with changes in post-merger performance are analyzed. Table 3 reveals our results that

show the relationships between acquirer and target pre-merger ratio and the merger-related changes in those same ratios. As we notice from Table 3 (the second column), the  $ROA_w$ ,  $ROE_w$ ,  $CER_w$  ratios (the relative difference in acquirer and target ratios) have little influence on changes in post-merger performance as  $Corr(\Delta ROA, ROA_w)$ ,  $Corr(\Delta ROE, ROE_w)$ , and  $Corr(\Delta CER, CER_w)$  are statistically insignificant. This finding is comparable with those reported by Berger and Humhrey (1992) and Pilloff (1996) who examine the relationship between acquirer-target differences and changes in post-merger performance.<sup>12</sup>

**Table 3**  
**Correlations of performance changes with pre-merger performance variables**

	$Corr(\Delta R, R_w)$	$Corr(\Delta R, R_{wA})$	$Corr(\Delta R, R_{wT})$
<b>Ratio (R)</b>	<b>(1985-1989)</b>		
ROA=Net Income/Total Assets	0.119	-0.234*	0.475***
ROE= Net Income/Total Equity	0.247	-0.215**	0.469***
CER=Non-interest Expense/Total Assets	0.263	0.152	-0.228**
	<b>(1990-1994)</b>		
ROA=Net Income/Total Assets	0.228	-0.184*	0.323**
ROE= Net Income/Total Equity	0.349	-0.146**	0.277**
CER=Non-interest Expense/Total Assets	0.161	-0.135	-0.169*
	<b>(1995-1999)</b>		
ROA=Net Income/Total Assets	-0.065	-0.93	0.283*
ROE= Net Income/Total Equity	0.155	-1.05**	0.160**
CER=Non-interest Expense/Total Assets	0.072	-0.057	-0.029
	<b>Full sample</b>		
ROA=Net Income/Total Assets	0.315	-0.131*	0.479***
ROE= Net Income/Total Equity	0.058	-0.307	0.463***
CER=Non-interest Expense/Total Assets	0.262	-0.154	0.180.

Note: The term  $\Delta R$  is the difference between pre-merger and post-merger ratio. The term  $R_w$  is the weighted difference between acquirer and target ratio. The term  $R_{wA}$  is the weighted measure of acquirer pre-merger ratio, and  $R_{wT}$  is the weighted measure of target pre-merger ratio. All ratios are controlled for size.

\*, \*\*, \*\*\* indicate significant at the 10%, 5%, and 1% level, respectively.

The results in column (3) suggest that acquirer pre-merger ROA, and ROE ratios are correlated to post-merger changes. The correlation between  $ROA_{wA}$  ( $ROE_{wA}$ ) and their respective  $\Delta ROA$  ratios are significantly negative, suggesting that

<sup>12</sup> Their sample was limited to banks with assets over \$1 billion.

mergers are associated with profitability losses when acquirer profitability is high and therefore contributing to such losses. Stated differently, the greater the acquirer's profitability, the more negative the merger's earnings impact is. On the other hand, a positive correlation exists between  $ROA_{WT}$  ( $ROE_{WT}$ ) and  $\Delta ROA$  (column 4) implies that targets with high profitability are associated with high post-merger gains. Last, correlation coefficient between  $\Delta CER$  and  $CER_{WT}$  is negative and statistically significant. This implies the larger the target's expense ratio, the greater efficiency gain if the combined firm.

#### 4.1.6 Performance changes with size

Pilloff (1996) hypothesizes that performance changes may be related to both size and relative size of acquirer and target. To test the influence of a merger partner's size, correlations between changes in performance measures (ratios) and the target's and acquirer's size, and their relative size are examined in Table 4. Interestingly,  $\Delta ROA$  and  $\Delta ROE$  (changes in profitability) are positively related to the target size (column 3), while the acquirer's profit characteristic is positive but insignificant (column 2). This result implies that the profits are more likely to increase when the target is larger. The results in column (4) suggest that the larger the relative size of the target, the greater the profitability of the combined firm. Collectively, these findings indicate that large targets are associated with greater merger gains. Our results are comparable with those reported by Pilloff (1996).

#### 4.1.7 Summary of long-run operating performance

Before-and-after merger comparisons are unambiguously favorable with ROE ratio, which is always higher after merger than it is before. This result indicates that bank mergers increase profitability in terms of return on equity (ROE). The comparisons are unfavorable with return on assets ratio (ROA), showing insignificant improvement in the 1985-1989 and 1990-1994 periods. However, ROA increased significantly following the 1995-1999 period, suggesting that recent banks mergers seem to be more profitable (ROA) than earlier bank mergers. The mixed results obtained using profitability ratios (ROA, ROE) is consistent with those reported by Cornett and Tehranian (1992). They argue that such findings may indicate that improvement in accounting measures of profitability surrounding the merger may be due to management's choice of debt versus equity financing rather than the more efficient management of assets. ROA is conventionally considered a better indicator of bank's efficiency in asset management, where as ROE is more directly a measure of return to stockholders. Lastly, before-and-after comparisons are ambiguous with cost ratio measure. Even though there is a decrease in this ratio in the 1985-1989, 1990-1994, and 1995-1999 periods, the decrease is only statistically significant for the 1995-1999 subperiod. This implies only more recent bank mergers were able to achieve significant cost cuts. When we analyze our results separately for large mergers and small mergers, we find evidence that mergers of large banks achieved higher improvements in ROE compared to small bank mergers, while mergers in which small banks are involved show large cost savings compared with



the large bank mergers. Interestingly, we find evidence that large targets are associated with more successful mergers. Lastly, we find that the following target banks are likely to associate with successful mergers – more profitable targets with higher return on assets (ROA) and/or rerun on equity (ROE).

**Table 4**  
**Correlations of performance changes with size and relative size**

<b>Ratio Change</b>			
<b>(1985-1989)</b>			
$\Delta ROA$	0.155	0.119**	0.261*
$\Delta ROE$	0.148	0.059**	0.349***
$\Delta CER$	0.081	0.077	-0.311
<b>(1990-1994)</b>			
$\Delta ROA$	0.199	0.286***	0.163**
$\Delta ROE$	0.211	0.356**	0.328**
$\Delta CER$	0.095*	-0.018	-0.304
<b>(1995-1999)</b>			
$\Delta ROA$	0.167	0.233**	0.292*
$\Delta ROE$	0.133	0.150*	0.445***
$\Delta CER$	-0.108	-0.220	-0.298
<b>Full Sample</b>			
$\Delta ROA$	0.237	0.168***	0.346***
$\Delta ROE$	0.225	0.141*	0.220***
$\Delta CER$	0.039	-0.097	-0.116

Note: The term  $\Delta R$  is the difference between pre-merger and post-merger ratio. The terms  $SIZE_A$  and  $SIZE_T$  are the log of acquirer's and target's total assets. Relative size equals target total assets divided by target plus acquirer total assets. Total assets are measured at the end of the year before the merger date.

All ratios are controlled for size.

\*, \*\*, \*\*\* indicate significant at the 10%, 5%, and 1% level, respectively.

## 4.2 Long-run stock performance of bank mergers

In the previous section, we have reported that the post-merger operating performance Although the operating performance of bank mergers deteriorates, it might be that this performance is anticipated by investors and may already be factored into the stock price. We address this issue by examining the long-run stock performance of merged banks. We examine the long-run stock return performance of the mergers in our sample two ways. First, we compute the buy-hold-abnormal returns (BHAR) of the merged banks relative several benchmarks.<sup>13</sup> Second, We use the Fama-French three-factor regression model.

### 4.2.1 BHAR Results

<sup>13</sup> BHAR is similar to the measures used in takeover study of Loughran and Vjih (1997).

This section examines the long-run stock performance of merged banks using the BHAR technique. Long-run performance is measured by comparing the returns on merged banks and returns on a benchmark made up of matched banks over periods of three, and five years. Fama and French (1992) document that firm size may influence returns statistics. Therefore, we analyze the long-run stock performance of the aggregate bank merger sample after sorting by size. Table 5 divides the sample into two groups on the basis of median market value. Five-year and three-year buy-and-hold returns are calculated over identical time periods for the merger banks and two different benchmarks, the -CRSP value- weighted NYSE-Amex-Nasdaq index and the equally-weighted bank index. BHARs measure the average multi-year return from a strategy of investing in all merged banks and selling at the end of a pre-specified holding period versus a comparable strategy using otherwise non-merged banks.

**Table 5**  
**Average BAHR for bank mergers**

The benchmark BAHRs are calculated over identical time period as for the mergers. The daily bank index is created by equally weighting all firms with SIC code of 602 or 671 on CRSP. The sample is divided into two size groups on the basis of the median market value. The t-statistics (in parentheses) are calculated assuming independence among observations.

Size group	Bank mergers returns	Benchmark index returns	Excess returns	(t-statistic)
<b>Panel A : Five-year BAHR, benchmark is value weighted NYSE-Amex-Nasdaq index</b>				
All Banks	24.5%	42.9%	-18.4%	(-2.17)
Small	35.8%	43.4%	-7.6%	(-0.52)
Large	15.6%	41.3%	-25.7%	(-2.92)
Difference				-1.89
<b>Panel B : Five-year BAHR, benchmark is equally weighted bank index</b>				
All banks	22.5%	27.3%	-4.8%	(-1.45)
Small	35.8%	39.5%	-3.7%	(0.32)
Large	15.6%	35.2%	-19.6%	(-1.96)
Difference				-2.04
<b>Panel C: Three-year BAHR, benchmark is value weighted NYSE-Amex- Nasdaq index</b>				
All Banks	15.3%	32.9%	-17.6%	(-3.19)
Small	26.7%	41.5%	-14.6%	(-0.82)
Large	18.6%	39.4%	-20.8%	(-3.92)
Difference				-2.08
<b>Panel D: Three-year BAHR, benchmark is equally weighted bank index</b>				
All banks	15.3%	26.6%	-11.3%	(-1.21)
Small	26.7%	34.8%	-8.1%	(0.55)
Large	18.6%	32.3%	-13.7%	(-2.93)
Difference				-2.56

As shown in Panel A of Table 5, for the merged banks, the five-year holding period return is 24.5%, while the holding-period return for their peer group is 42.9%. The difference in holding-period returns is -18.4% and is significant at the one percent level. The significance of the raw and abnormal returns is tested by using *t*-statistics.<sup>14</sup> This suggests that the merged banks significantly underperform the CRSP value-weighted NYSE-Amex-Nasdaq index over the five-year holding period by -18.4%. It is interesting to note that this poor performance can be attributed to the larger banks in the sample, which lagged the index by -25.7%. In Panel B, we compare the merger banks to the equally weighted bank index. The results still indicate that merged banks significantly underperform their peer group. However, the difference in holding-period return is lower in this case (-11.3%). Further, the results indicate that the largest banks lagged the bank index by -13.7% over the five-year period. Panel C presents three-year buy-and-hold returns over identical time periods. As we can observe from this Panel, the three-year buy-and-hold return for the merged banks is 15.3% compared to 32.9% for NYSE/ Amex value-weighted index, showing significant (at the one percent level) underperformance of 17.6% over three years. The results indicate that stockholders of the merged banks suffer statistically significant wealth loss of about 17.6% over the three years following the merger completion. Consistent with our finding in Panels A and B, the poor performance can be attributed to the larger banks in the sample, which lagged the index by -20.8%. In Panel D of this table, we compare the merger banks to the equally weighted bank index. The results still indicate that merged banks significantly underperform their peer group. However, the difference in holding-period return is lower in this case (-11.3%). Further, the results indicate that the largest banks lagged the bank index by -13.7% over the five-year period.

Table 6 presents the long-run performance for the sample of bank mergers from an event time strategy in which each merger constitutes an event. In panel A, we weight the returns of the bank mergers and their benchmarks equally. One of our metrics to measure abnormal returns is the wealth relative. Loughran and Ritter (1995) and Spiess and Affleck-Graves (1995) calculate wealth relatives for the five year period by taking the ratio of one plus the equal-weighted return on the bank merger portfolio over one plus the equal weighted return on the chosen benchmark. Wealth relatives greater than one imply that merged banks have higher returns than their matching banks, while wealth relatives less than one imply underperformance by the merged banks compared to their matching banks. As we can see in panel A (Table 6), the five-year wealth relative is less than 1.0 for all benchmarks, ranging from 0.82 to 0.92. The five-year excess returns are all negative, anywhere from -11.71% versus matched banks (peer) to -30.02% versus the CRPS value-weighted index. Stated differently, the average holding-period return for bank mergers is 35.24%, while the average holding-period return for their industry-and-size matched counterparts is 46.24%. This 11% difference is statistically significant at the 0.01 level using a paired

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<sup>14</sup> These statistics have become the standard in the long-run performance literature since Ritter (1991).

t-test ( $t = 4.82$ ). As alternative measure of long-run performance for merged banks, the five-year wealth relative, gives similar findings. The wealth relative for year 5 is 0.92 indicating substantial merged banks underperform the matched bank control group. Stated differently, a strategy of investing in banks engaged in merger at the close of trading on the day of the merger and holding them for five years would have left the investor with only 92.0 cents relative to each dollar invested in size matched banks that did not engage in merger.

**Table 6**

**Long-run stock returns of bank mergers, relative alternative benchmarks.**

Five-year equal and value weighted buy-and-hold returns on bank mergers are compared with alternative benchmarks. Abnormal return is the simple difference between bank mergers five-year average return and the corresponding benchmarks. All Returns on the banks mergers and benchmarks portfolio are taken from the CRSP files.

Benchmarks	Bank mergers returns	Benchmark index returns	Abnormal return	Wealth relative
<b>Panel A : Equal weighted buy-and-hold returns (%)</b>				
CRSP VW	35.24	65.26	-30.02	0.82
CRSP EW	35.24	60.84	-25.60	0.84
NYSE-Amex-Nasdaq VW	35.24	58.62	-23.38	0.85
Matched banks	35.24	46.95	-11.71	0.92
<b>Panel B : Value weighted buy-and-hold returns (%)</b>				
CRSP VW	50.10	67.32	-17.22	0.90
CRSP EW	50.10	63.46	-13.36	0.92
NYSE-Amex-Nasdaq VW	50.10	59.37	-9.27	0.94
Matched banks	50.10	70.33	-20.20	0.88

Note: wealth relative =  $(1 + \text{average five-year total return on merged banks}) / (1 + \text{average five-year total return on matched banks})$ .

Panel B presents value-weighted results for our sample. In panel B value weighting reduces, but does not eliminate, underperformance. Wealth relatives are now between 0.88 and 0.94 and the excess return is between -9.27% and -20.20%. It is noteworthy that the average holding-period return for bank mergers is 50.10%, while the average holding-period return for their book-to-market-and-size matched counterparts is 70.30%. This 20.20% difference is statistically significant at the 0.01 level using a paired t-test ( $t = 5.77$ ). The results indicate that holding this investment for five years would have left the investor with only 88.0 cents relative to each dollar from investment in similar non-bank mergers.

Recent studies of bank mergers such as Becher (2000) and Houston et.al. (1994) find that bank mergers create value for the combined firms, with a statistically significant positive mean. In other words, the announcement of bank mergers has positive impact on shareholder wealth of the combined firm. Unlike the

announcement period literature, our findings indicate that there is significantly negative long-run impact on shareholder wealth. In other words, long-run stock returns do not improve following bank mergers. An important aspect of our findings is that the market may overreact at the time of the announcement. As a result, we argue that prior studies that focus on return at the time of announcement may be inadequate, and it may be necessary to examine performance over an extended period following the merger to determine the full impact of that merger.

#### **4.2.2 Fama-French three factor model**

In order to ascertain that our long-run abnormal returns are not the products of a mis-specified methodology, we apply the Fama and French (1993) three-factor model. The Fama and French three-factor time-series model has gained acceptance in the literature as a benchmark measure of abnormal returns. Therefore, as additional of robustness, we provide the results for this regression in Table 10. Table 10 reports the results of the Fama-French three-factor regressions on monthly returns for merged bank in their first five years after merging. We report OLS estimations for both value-weighted and equal-weighted portfolio returns. Since the number of firms in monthly portfolio varies over time, we also control for potentially heteroskedastic residuals by undertaking weighted least squares (WLS) estimation. Recall that the intercept ( $\alpha$ ) from this regression measures abnormal returns.

Table 7 reports that our sample bank mergers' estimated intercepts are all significantly negative. Intercepts for both equal-weighted and value-weighted samples are significantly negative. Value-weighting the merger banks' subsequent returns yields estimated monthly return of -3.8% using OLS or -5.7% using WLS estimation. The intercepts' t-statistics (-2.72 and -3.24) indicate that these abnormal returns differ from zero with 99% confidence. It is interesting to note that the negative abnormal return approximately compounds to over 10% in a five-year period. It is not obvious that one should value-weight the portfolio returns. Loughran and Ritter (2000) point out that value-weighting will reduce the extent of measured misvaluations, which are likely to be more prevalent among small firms. We, therefore, present results for equal-weighted portfolio returns in the second and last rows of Table 10. As predicted by Loughran and Ritter (2000), the equal-weighted intercepts (-8.5% and -9.6%) are somewhat larger than those in value weighting.

Table 8 reports results for Fama-French regressions similar to those reported in Table 7, but with the time frame reduced to three years following the merger. Shorting the interval for subsequent merger provides a few changes in the results. The full-sample value-weighted intercept is now -1.9% using OLS or 4.5% using WLS estimation. These values are lower than those reported in Table (7). However, Table 8 results support the hypothesis that merged banks have negative long-run performance in the first three years after the merger.

If the negative intercept in Tables 7 and 8 is from the three-factor model's inability to fit the type of banks in our merger sample, we should also find negative intercepts for the matched peer banks (non-merged banks). Table 9 represents the result of

**Table 7**  
**Fama and French (1993) three-factor regression on monthly returns for bank mergers**

Regression coefficient	$\alpha$	$\beta_1$	$\beta_2$	$\beta_3$	Adjusted $R^2$
<b>Panel A: Ordinary least squares regressions (OLS)</b>					
Value-weighted sample	-0.038***	1.20***	0.34***	0.11*	0.674
(t-statistics)	(-2.72)	(32.45)	(3.62)	(1.83)	
Equal-weighted sample	-0.085***	1.06***	1.34***	0.22**	0.791
(t-statistics)	(-3.32)	(16.12)	(8.23)	(2.42)	
<b>Panel B: Weighted least squares regressions (WLS)</b>					
Value-weighted sample	-0.057**	1.15***	0.38***	0.90**	0.803
(t-statistics)	(-3.24)	(32.35)	(4.04)	(2.32)	
Equal-weighted sample	-0.096**	1.35***	0.91***	0.34**	0.845
(t-statistics)	(-5.21)	(19.07)	(9.06)	(2.63)	

\*, \*\*, and \*\*\* denote significant at 1%, 5% and 10% levels respectively.

$R_{pt} - R_{ft} = \alpha + \beta_1(R_{mt} - R_{ft}) + \beta_2SMB_t + \beta_3HML_t + \varepsilon_{pt}$  where  $R_{pt}$  is the return of bank p's stock on in month t;  $R_{ft}$  is the risk-free interest rate in month t, typically using the 3-month T-bill rate in month t;  $R_{mt}$  is the market return in month t, using the return to CRSP value-weighted composite market index;  $SMB_t$  is the monthly difference between a group of small firms and a group of large ones;  $HML_t$  is the monthly difference in returns between firms with high book-to-market and low book-to-market firms, and  $\varepsilon_{pt}$  is an error term. WLS refers to weighted least squares where the weight is the square root of the number of bank mergers present each month. All t-statistics use White (1980) corrected standard errors

**Table 8**  
**Fama and French (1993) three-factor regression on monthly returns for bank mergers**  
**(three years following merger)**

Regression coefficient	$\alpha$	$\beta_1$	$\beta_2$	$\beta_3$	Adjusted $R^2$
<b>Panel A: Ordinary least squares regressions (OLS)</b>					
Value-weighted sample	-0.019***	3.91***	0.09**	0.10	0.721
(t-statistics)	(1.87)	(20.77)	(2.56)	(1.53)	
Equal-weighted sample	-0.026**	2.16***	.034**	0.042	0.560
(t-statistics)	(2.42)	(60.22)	(2.58)	(0.079)	
<b>Panel B: Weighted least squares regressions (WLS)</b>					
Value-weighted sample	-0.037*	1.55***	0.98***	0.14*	0.841
(t-statistics)	(1.94)	(22.46)	(8.54)	(1.92)	
Equal-weighted sample	-0.045***	1.67***	1.91***	0.23	0.723
(t-statistics)	(5.21)	(33.38)	(10.49)	(1.48)	

\*, \*\*, and \*\*\* denote significant at 1%, 5% and 10% levels respectively.

$R_{pt} - R_{ft} = \alpha + \beta_1(R_{mt} - R_{ft}) + \beta_2SMB_t + \beta_3HML_t + \varepsilon_{pt}$  where  $R_{pt}$  is the return of bank p's stock on in month t;  $R_{ft}$  is the risk-free interest rate in month t, typically using the 3-month T-bill rate in month t;  $R_{mt}$  is the market return in month t, using the return to CRSP value-weighted composite market index;  $SMB_t$  is the monthly difference between a group of small firms and a group of large ones;  $HML_t$  is the monthly difference in returns between firms with high book-to-market and low book-to-market firms, and  $\varepsilon_{pt}$  is an error term. WLS refers to weighted least squares where the weight is the square root of the number of bank mergers present each month. All t-statistics use White (1980) corrected standard errors.

**Table 9**  
**Fama and French (1993) three-factor regression on monthly returns for non-merged banks (three year following merger)**

Regression coefficient	$\alpha$	$\beta_1$	$\beta_2$	$\beta_3$	Adjusted $R^2$
<b>Panel A: Ordinary least squares regressions (OLS)</b>					
Value-weighted sample	0.050**	0.09**	0.29***	0.04	0.564
(t-statistics)	(2.47)	(2.17)	(3.56)	(0.65)	
Equal-weighted sample	0.032**	0.08	.044**	0.12***	0.686
(t-statistics)	(2.16)	(1.22)	(3.58)	(2.89)	
<b>Panel B: Weighted least squares regressions (WLS)</b>					
Value-weighted sample	0.075***	1.5*	0.48***	0.14**	0.621
(t-statistics)	(3.76)	(1.75)	(6.14)	(2.32)	
Equal-weighted sample	0.086***	0.12*	0.91***	0.22***	0.754
(t-statistics)	(4.21)	(33.38)	(12.49)	(6.38)	

\*, \*\*, and \*\*\* denote significant at 1%, 5% and 10% levels respectively.  $R_{pt} - R_{ft} = \alpha + \beta_1(R_{mt} - R_{ft}) + \beta_2SMB_t + \beta_3HML_t + \varepsilon_{pt}$  where  $R_{pt}$  is the return of bank p's stock on in month t;  $R_{ft}$  is the risk-free interest rate in month t, typically using the 3-month T-bill rate in month t;  $R_{mt}$  is the market return in month t, using the return to CRSP value-weighted composite market index;  $SMB_t$  is the monthly difference between a group of small firms and a group of large ones;  $HML_t$  is the monthly difference in returns between firms with high book-to-market and low book-to-market firms, and  $\varepsilon_{pt}$  is an error term. WLS refers to weighted least squares where the weight is the square root of the number of bank mergers present each month. All t-statistics use White (1980) corrected standard errors



**Table 10****Long-run stock returns of bank mergers categorized by year of merger**

Three-year equal and value weighted buy-and-hold returns on bank mergers are compared with alternative benchmarks. Abnormal return is the simple difference between bank mergers three-year average return and the corresponding benchmarks. All Returns on the banks mergers and benchmarks portfolio are taken from the CRSP files. The matched banks are chosen on the basis of size.

Year	Bank mergers %HPR	Matched banks %HPR	Wealth relative
1985	8.4	33.6	0.81
1986	10.9	34.4	0.83
1987	15.5	41.2	0.82
1988	12.5	40.0	0.80
1989	24.7	45.2	0.86
1990	32.5	60.6	0.83
1991	28.6	51.3	0.85
1992	30.5	44.0	0.91
1993	20.2	30.4	0.92
1994	36.4	49.8	0.91
1995	39.9	51.2	0.93
1996	45.3	57.3	0.92
1997	52.3	60.6	0.95
1998	39.2	48.1	0.94
1999	48.6	54.5	0.96

Note: wealth relative =  $(1 + \text{average three-year total return on merged banks}) / (1 + \text{average three-year total return on matched banks})$ .

estimating the Fama-French regressions of the style-matched peer banks. The intercept terms are always positive, suggesting positive long-run abnormal returns. For example, Panel A shows that the value-weighting the merger banks' subsequent returns yields estimated monthly return of 5% using OLS or 7.5% using WLS (Panel B). The intercepts' t-statistics (2.47 and 2.16) shows that these abnormal return are statistically significant. These findings are consistent with the hypothesis that bank mergers themselves are associated with poor performance manifested in Tables 7 and 8.

#### 4.2.3 Time-series patterns in the post-bank merger performance

The above results indicate that the stocks of merged banks perform poorly after merger. It can be instructive to examine whether this result pervades our entire sample or is confined to certain years. Accordingly, we examine each calendar year to determine if the under-performance is concentrated in certain years of the study. In Table 10, banks are categorized by the year in which the merger occurred. The results indicate that significant underperformance by bank mergers is not concentrated in a particular time period. In the 15 years covered by our sample, all

years have three-year matched-bank wealth relatives less than one; that is the average performance of the bank mergers sample in the subsequent three years worse than that of comparable sized banks. Our findings indicate that investors who buy immediately after listing and hold shares for five years will make substantial losses. It is noteworthy that when we examine the wealth relatives for the most recent bank mergers (during the 1995-1999 period), there is still some evidence of underperformance but it is much smaller. Most three-year wealth relatives are close to one. Therefore, we can conclude that the underperformance has diminished in recent years.

## 5. Conclusion

The last decade has witnessed an extraordinary pace of bank merger and acquisitions, dramatically changing the structure of the U.S. banking industry. The number of banks has notably declined, with fewer smaller banks and more large money center banks. This study analyzes the long-run stock returns and operating performance following bank mergers. A better understanding of the long-run performance of bank mergers may shed some light on the implications of continuing mergers and acquisitions in the banking industry. To this end, we examine the post-merger performance of 662 bank mergers between 1985 and 1999. Accounting data from both pre-merger and post-merger data are used in the analysis and evaluated for evidence of a change in the performance around the merger activity. Particularly, we utilize conventional ratios such as return on assets (ROA) and return on equity (ROE). ROA and ROE capture the profitability of banks (profitability indicators). We also examine an operating cost ratio (CER) that excludes interest expenses. CER is a measure of cost control and is perceived as important to find whether there is cost saving associated with bank mergers. Consistent with previous studies, our findings suggest that the various expected performance and earning benefits of bank mergers may not in fact be realized. The performance effects measured by profitability ratios are mixed. Merged banks show no significant improvement in ROA relative to their peer group, while they have significant improvements in ROE. Also, no significant improvement in CER following the mergers is found. We also find that more recent bank mergers (1995-1999 period) are associated with significant improvement in ROE and CER, suggesting profit and cost efficiency associated with the most recent bank mergers. As for the 1985-1989 and 1990-1994 period, changes in ROE and CER do not indicate that merged banks performed better in the post-merger period. Further, we find evidence that mergers of large banks achieved higher improvements in ROE compared to small bank mergers, while mergers in which small banks are involved show larger cost savings (CER) compared with the large bank mergers. We also find evidence that large targets are associated with more successful mergers. Lastly, we find that the following target banks are likely to be associated with successful mergers – more profitable targets with higher return on assets (ROA) and/or return

on equity (ROE). In other words, large targets are associated with more successful mergers.

Our second objective is to evaluate the long-run stock return following bank mergers. Such an evaluation of the long-run stock performance has been made possible by new, improved long horizon methodologies that have been applied to a variety of corporate events, including mergers. Buy-and-hold abnormal returns (BHARs) and Fama and French (1993) three-factor model are used to measure long-run performance effects. To our knowledge, this first study to examine the long-run performance of merged banks using those two techniques. The results of long-run stock returns show that merged banks have under-performed their peer group of non-merged banks. One possible explanation of this underperformance (large negative returns after mergers) is that the market is slow to adjust to the merger event. If so, the long-run stock returns performance reflects that part of the net present value of the merger to the acquirer that is not captured by the announcement period return. This poor performance can be attributed to the larger banks in the sample. This result confirms our earlier finding, suggesting that size is an important explanatory variable of long-run post-merger performance. Finally, we partition our sample by time period, and find evidence that more recent bank mergers are associated with better performance than earlier mergers. However, the average performance of recent mergers is still worse than that of comparably sized banks. Taken as a whole, the empirical findings indicate long-run benefits from bank mergers appear to be absent.

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